

EFFECTS OF VIDEO-ASSISTED TRAINING ON EMPLOYMENT-RELATED SOCIAL SKILLS OF ADULTS WITH SEVERE MENTAL RETARDATION

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Two studies investigated effects of video-assisted training on employment-related social skills of adults with severe mental retardation. In video-assisted training, participants discriminated a model's behavior on videotape and received feedback from the trainer for responses to questions about video scenes. In the first study, 3 adults in an employment program participated in video-assisted training to request their supervisor's assistance when encountering work problems. Results indicated that participants discriminated the target behavior on video but effects did not generalize to the work setting for 2 participants until they rehearsed the behavior. In the second study, 2 participants were taught to fix and report four work problems using video-assisted procedures. Results indicated that after participants rehearsed how to fix and report one or two work problems, they began to fix and report the remaining problems with video-assisted training alone.

DESCRIPTORS: social skills, employment, videotape modeling, mentally retarded

Adults with mental retardation must learn numerous social skills to be successful in their employment (Salzberg, Agran, & Lignugaris/Kraft, 1986). Researchers have examined several procedures to teach employment-related social skills to these adults (see Andrasik & Matson, 1985, for a review). Many social skills interventions involve the presentation of models showing desired behavior (e.g., Bates, 1980; Chadsey-Rusch, Karlan, Riva, & Rusch, 1984). Models may be presented live (Bandura, 1969; Chadsey-Rusch et al., 1984) or on videotape (Bandura, Ross, & Ross, 1963; Bornstein, Bach, McFall, Friman, & Lyons, 1980; Krantz, MacDuff, Wadstrom, & McClannahan, 1991; Striefel & Eberl, 1974).

In this research, video-assisted training consisted of viewing a model's behavior on videotape, ensuring the learner correctly discriminates the behavior, and reinforcing the learner's verbal responses to questions about the video scenes. Video

may be used to assist the training process in at least two ways. First, a learner may discriminate a model's behavior on video, then be expected to display the behavior later (Haring, Kennedy, Adams, & Pitts-Conway, 1987). Second, a learner's best performance may be videotaped and then shown as the model. The latter procedure has been referred to as self-modeling (Dowrick & Hood, 1981).

Video may offer several training benefits (Krantz et al., 1991). First, video models can present various behaviors in realistic contexts. Second, video can efficiently display numerous examples of stimulus and response variations. Third, video may be a useful medium for learners with severe mental retardation who cannot take advantage of print materials. Fourth, with video recordings, the learner can repeatedly review a model's behavior; if necessary. Finally, video standardizes the presentation of stimuli in training, which strengthens internal consistency and allows more confident comparison of data across learners and sessions.

Investigators have examined the effects of video-assisted training on skills of children and adults with disabilities (e.g., Bornstein et al., 1980; Charlop & Milstein, 1989; Haring et al., 1987). Haring and colleagues (1987) reported that social behaviors of adults with autism generalized to and were maintained in community locations after the adults

This article presents dissertation research conducted by the first author and was supported by a research grant awarded by the Bureau of Research, College of Education, Utah State University. We thank the participants, as well as James Shaver, Sarah Rule, Margo Stevens, and dissertation committee members for their assistance and support.

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observed a model on video. These adults observed video models only after receiving training that included instructions and prompting from the trainer. Also, video modeling was augmented by behavioral rehearsal and direct training in community locations. Results indicated that the training procedures increased and maintained the use of social amenities, greetings, and purchasing behaviors in the initial training location and four probe settings. However, it was unclear whether video modeling or other procedures accounted for the generalization and maintenance of effects.

Additional research on video-assisted training is necessary for several reasons. First, research must isolate the function of video from other procedures, such as behavioral rehearsal, to determine whether video alone is effective. Second, as Dowrick and Hood (1981) recommended, research should compare the effects of observing an unfamiliar model and oneself as the model to identify any differential effects. Third, research should examine the relationship between discriminating behaviors on video and performing them in the natural environment. Fourth, research must investigate procedures that help adults with severe disabilities become more adept video learners. Therefore, two studies are presented here. Study 1 examined the effects of video-assisted training on acquisition, generalization, and maintenance of an employment-related social skill. Study 2 addressed questions about whether these adults become more adept video learners as a function of different types of video-assisted training.

STUDY 1

METHOD

Participants

Nine adults with severe mental retardation in an employment training program who had limited social skills were identified. From these adults, 3 participants were selected based on several criteria, including (a) correct verbal identification of work-related materials (e.g., broom, pipe parts) and actions (e.g., picking up a box) presented in a video pretest, (b) 50% or fewer correct discriminations

of appropriate social behaviors shown in another video test that presented workers displaying both appropriate and inappropriate social behaviors, (c) no occurrences of the targeted social behavior (i.e., requesting assistance from the work supervisor) exhibited in a role-play pretest, and (d) 10 or more correct responses on the Peabody Picture Vocabulary Test (PPVT), indicating basic receptive language skills.

Janice was a 37-year-old woman with severe mental retardation. Her estimated intelligence level on the Leiter International Performance Scale (LIPS) was below 40. Her PPVT score indicated a receptive language equivalence of 4 years 7 months. Janice lived at home with her mother and had participated in the employment program for about 10 years. Program staff members indicated that she rarely initiated interaction with peers or supervisors, but usually responded with a short phrase if asked a direct question. They described her as polite but withdrawn.

Brenda was a 37-year-old woman with severe mental retardation (IQ = 29; Stanford-Binet Intelligence Scale). Her PPVT age equivalence score was 6 years 10 months. She lived in a group home and had worked at the program for about 1 year. Brenda frequently displayed stereotypic behaviors, such as repeatedly adjusting her clothing and picking her fingernails. She frequently interacted with peers and supervisors, and was described by staff as gregarious and hyperactive. Records indicated that Brenda experienced an unspecified hearing loss. However, any hearing loss was apparently not dysfunctional because she consistently and correctly responded to verbal communication in the work settings.

Dale was a 34-year-old man with severe mental retardation (IQ below 40; LIPS) and Down Syndrome. His PPVT age equivalence score was 2 years 11 months. He lived at home with his parents and had participated in the program for about 6 years. Dale rarely initiated interaction with peers or supervisors but readily smiled if someone else initiated interaction. He was characterized by staff as affable, but slow and disinterested in work.

All participants verbally communicated in single

words or short phrases, imitated simple motor responses, attended to work tasks for 1 to 3 min, and followed one-part verbal instructions. They performed work assignments such as vacuuming, cleaning, assembling PVC pipe, and cutting and tying string. Janice and Dale performed work tasks relatively slowly and stopped when problems were encountered. Brenda often performed tasks rapidly and haphazardly.

Setting

The setting for this research was a preparatory and supported employment program. Training occurred in a room (5 m by 3.5 m). Probes were conducted in several work settings (i.e., an adjacent 16-m by 7.5-m workroom, a hallway, and a kitchen) where participants frequently engaged in supported work or employment training.

Target Behavior

The targeted social skill was requesting assistance from the work supervisor. This behavior was targeted because (a) observations in the employment program and pretest results indicated that the selected participants did not ask for help when they needed it, (b) supervisors reported that requesting assistance was a high priority for the participants, and (c) this social behavior had been judged important by employers in survey research (Salzberg et al., 1986).

Definition of requesting assistance. The definition for requesting assistance was devised after receiving input from five employers of entry-level workers who responded to a telephone survey. These employers preferred that workers request assistance by verbalizing a social amenity (e.g., "excuse me, please") and by stating the need for assistance (e.g., "help") to the supervisor. All employers agreed that assistance should be requested within about 1 min of identifying or encountering a problem. Therefore, requesting assistance was defined according to two component responses: (a) approaching the supervisor within 1 min of encountering a work problem and verbalizing a social amenity and (b) verbally describing to the supervisor the problem and/or the need for assistance. Therefore, gen-

eral responses (e.g., "help please") or responses that combined a social amenity and a description of the problem (e.g., "Excuse me. The box is too heavy") were considered correct in any problematic situation. In video discrimination training, the participants were also taught a third component: identifying the problem. For example, participants were taught to identify a worker attempting to lift a heavy box as a problem requiring assistance.

Problem situations. Prior to the study, program supervisors identified 27 situations requiring that workers request assistance. By observing responses of workers to these situations in the employment program, the first author systematically selected 16 for use in the study. Selected situations were those in which (a) assistance from someone was necessary to ensure safety or maintenance of work routine and (b) a request for assistance (as defined above) was necessary and sufficient for the problem to be solved. Eight situations were identified for training (i.e., training situations) and eight were reserved to test for generalized effects (i.e., probe situations). Table 1 describes the 16 situations and sample responses.

Dependent Measures

The effects of video-assisted training were measured by examining the percentages of correct social amenities and statements of the need for assistance in video discrimination, work setting, and 60-day follow-up assessments. In the video discrimination assessment, identification of the problem was also assessed. All data were separated to reflect performance in training and probe situations. Also, community employers' ratings of each participant's requests for assistance in pre- and postassessments were used to evaluate the social validity of training outcomes (Wolf, 1978).

Assessments

Video discrimination assessment. In this assessment, the trainer (i.e., first author) presented videotaped scenes of an unfamiliar worker without disabilities requesting assistance of her supervisor. Scenes averaged about 30 s long and ranged between 18 s and 75 s long. For each of the 16 work

Table 1
Description of Work Situations Used in Teaching Participants to Request Assistance

Situation	Supervisor's instruction	Problem	Sample correct response
Training			
Box to table	"Move that box to this table."	The box is large and heavy.	"Help, please."
Box from top shelf	"Get that box from the top shelf."	The box is out of reach and no assistive device is nearby.	"Excuse me. Help, please."
Heavy table	"Move the table over here."	The table is heavy.	"Help, please. The table is heavy."
Struck pipe	"Take apart all of these pipe parts."	Two parts are stuck together.	"Pardon me. These are stuck."
Wrong key	"Put this bottle in the closet."	Supervisor gives the worker the wrong key to the closet.	"Help, please. Wrong key."
Defective bottle of cleaner	"Clean the top of this table."	Supervisor gives the worker a bottle of cleaner with a plugged nozzle.	"Excuse me. It won't work."
Pipe parts missing from pipe tub	"Bring that tub full of pipe parts."	Pipe parts are missing from the pipe tub.	"Pardon me. The pipe parts are not in the tub."
Malfunctioning vacuum cleaner	"Vacuum the floor."	The vacuum switch does not work.	"Help, please. It won't work."
Probe			
No key	"Get the vacuum cleaner from the closet."	Closet door is locked and no key is available.	"Help, please."
Struck jar lid	"Open these jars and dump the parts into this big jar."	One of the four small jars has a lid that is stuck.	"Help, please. It's stuck."
No broom	"Go to the broom closet and get the broom."	No broom is in the closet or other location.	"Pardon me. I can't find the broom."
No water	"Fill the sink with water."	Both hot and cold water lines have been turned off.	"Excuse me. No water."
Incompatible pipe parts	"Put all of these parts together."	Supervisor gives worker 12 connector parts that do not fit.	"Help, please. It doesn't fit."
Box to back door	"Take this box back to the loading dock."	The box is large and heavy and no assistive device is nearby.	"Excuse me. The box is heavy."
Box to top shelf	"Put this box on the top shelf."	The box is heavy and no assistive device is nearby.	"Help, please."
Box flaps fail to close	"Put this box of string on the table."	Box flaps are damaged or missing. No other box is available.	"Pardon me. I need a new box."

situations listed in Table 1, separate scenes showed both correct and incorrect responses by the worker. Thus, 32 scenes were videotaped. These 32 scenes were divided among four videotapes, creating four tapes with eight scenes each. Scenes were divided so that each tape included four training and four probe situations. The order of training and probe situations on each tape was randomly determined. A videotape was selected according to a preset schedule so that the same tape was not shown in consecutive sessions to a participant.

After viewing each scene, the trainer asked the participant "What problem did you see?" "Tell me what the worker did," and "Should the worker have done anything else?" Specific response criteria were developed for work situations. (Response criteria for all work situations and all assessments may be obtained from the first author.) A data collector recorded whether the participant correctly identified each component (i.e., identification of the problem, social amenity, statement of the need for assistance). Data were expressed as the percentages of correct

component responses across all training or all probe situations. For example, in four probe situations, if a participant correctly identified two problems, one social amenity, and three statements of the need for assistance, the data were expressed as 50%, 25%, and 75%, respectively.

Work setting assessment. Two work situations were randomly selected from the set of eight training situations, and two were randomly selected from the set of eight probe situations to form each of four work sets. These work sets were used to assess requests for assistance in the work setting. The employment program supervisors assisted in this assessment by interacting with the participants, although supervisors were not informed of the specific target behavior. First, a supervisor delivered an instruction (e.g., "Vacuum the floor, please") which resulted in the participant encountering a problem (e.g., malfunctioning vacuum). Second, when the problem was encountered, the data collector recorded whether the participant used a social amenity and stated the need for assistance (e.g., "Excuse me, the vacuum doesn't work") to the supervisor. Data were expressed as the percentages of correct component responses in a work set.

Assessments were scheduled in the participants' customary work areas at least 1 hr after the conclusion of intervention sessions. Work situations and supervisors' instructions were embedded within routine work activities. Also, for each instruction involving a problem, two or more were interspersed that did not involve problems. Initially, one work set was scheduled weekly for each participant. Beginning with Session 20, the frequency of assessments was increased to two sets per week to accelerate the pace of the study. Data from the four situations in a single work set were combined across days, and were plotted on the last of those daily sessions. For example, if a participant received two work situations on Monday, one on Tuesday, and one on Wednesday, data from this work set were plotted on Wednesday's session.

Follow-up assessment. Video discrimination and work setting assessments were conducted 60 days after the end of the study. In the video follow-up assessment, the videotape was the same as the pre-

test tape. In the work setting assessment, one work set was randomly selected for each participant. Data were expressed as the percentages of correct component responses.

Social validity assessment with community employers. Edited videotapes of participants' requests for assistance in role-play assessments were shown to four employers representing entry-level service jobs. These employers were randomly selected from local telephone listings and included a personnel director of a hospital, a director of a nursing home, an owner of a dairy, and a supervisor at a veterinary clinic. Each participant's videotapes from a role-play pretest and a role-play posttest were identified; then scenes showing the same three work situations for each participant were edited onto another videotape. The order of pretest and posttest scenes was randomized on the tape. Employers were not provided information about the study, but were asked to rate how well the participant asked for the supervisor's assistance in each scene on a 5-point Likert-type scale from "very poorly" (1) to "very well" (5). Ratings were analyzed using a *t* test for correlated samples (Ferguson, 1981).

Experimental Design

The effects of video-assisted training were evaluated in a multiple baseline design across 3 participants (Barlow & Hersen, 1984). After baseline, four intervention conditions were arranged in the same sequence for each participant, to be implemented in a response-contingent manner. That is, successive interventions were implemented only if participants did not request assistance of supervisors in the work setting.

Procedure

Baseline. In baseline sessions, the trainer showed participants video scenes and asked them to respond to the same questions described in the video discrimination assessment. The trainer provided no feedback for responses. Sessions lasted about 20 min and were conducted individually. When data from video discrimination and work setting assessments were stable, the first intervention was im-

plemented with 1 participant. Baseline continued for the remaining 2 participants on a reduced schedule of one to three times weekly.

Intervention 1: Video discrimination training. In this intervention, participants (a) viewed video scenes of an unfamiliar worker who encountered problems requiring assistance, (b) observed a correct or an incorrect response by that worker, (c) identified the problem, and (d) identified the correct response or the correct alternative. For training situations, the trainer played one scene, stopped the video, and identified the problem and the response shown. Then, the trainer asked the participant to identify the problem, what the worker did, and whether anything else should be done. The trainer either praised the participant's correct response or provided the correct alternative while replaying the same scene. For probe situations, no praise or descriptions were provided. Intervention 1 continued until a participant identified at least 75% correct component responses for two consecutive daily sessions in the video discrimination probes and exhibited 75% correct component responses in two consecutive work sets. If a participant failed to meet this criterion after eight sessions or if no increasing trend in work setting performance was shown, the next intervention was implemented.

Intervention 2: Video discrimination training plus self-model. Intervention 2 was conducted only with those participants for whom Intervention 1 did not produce generalized requests for assistance in the work setting. Discrimination training procedures were identical to those of Intervention 1, except scenes of the unfamiliar worker were interspersed with scenes of the participant's behavior (i.e., self-model). Training scenes showing the self-model were created by editing videotape footage from role-play sessions. In the role-play sessions, participants responded to instructions from the trainer involving work situations while the data collector recorded responses on videotape. No training occurred in role-play sessions; these activities were strictly to assess the target behavior and generate videotape footage for self-modeling. Role-play sessions were conducted once or twice weekly and preceded intervention sessions. In the Intervention 2 discrimination training sessions, four self-

model video scenes were randomly interspersed with four probe scenes so the composition of the session was similar to Intervention 1. Criteria for changing intervention conditions were the same as those described for Intervention 1.

Intervention 3: Self-model plus familiar supervisor. Intervention 3 was conducted only if Interventions 1 and 2 did not produce requests for assistance in the work setting. In Intervention 3, four additional videotapes were produced showing the actual work supervisor delivering instructions to the same worker who modeled behaviors in the other videotapes. Except for the familiar supervisor, the videotapes showed the same material (i.e., work situations, instructions) as in Interventions 1 and 2. Two of four video training scenes in a session showed the familiar supervisor. These two scenes were interspersed with two scenes of the self-model. Four probe scenes were shown as previously described. Training and assessment procedures, tape selection, and phase change criteria were unchanged.

Intervention 4: Self-model, familiar supervisor, and behavioral rehearsal. In Intervention 4 sessions, the trainer stopped the videotape of the self-model or familiar supervisor when the work problem was shown. After correctly responding to the same set of assessment questions described above, the participant rehearsed how to request assistance in the training room. In behavioral rehearsal, the trainer arranged the same work problem as shown on the videotape and delivered the instruction to set the occasion for the participant to request assistance. If the participant responded correctly, the trainer delivered praise. If the participant responded incorrectly, the trainer replayed the scene and repeated rehearsal until the participant correctly requested assistance. Then, the trainer and participant watched the next scene. Probe scenes remained the same as described above. This intervention remained in effect until the participant met the criterion of 75% correct responses for two consecutive work sets.

Interobserver Agreement

The primary data collector and the trainer (second data collector) independently collected data in

Table 2
Participants' Mean Percentages of Correct Component Responses to Training Situations in Baseline and Video Discrimination Assessments

Participant and component response	Baseline	Experimental condition			
		Int 1	Int 2	Int 3	Int 4
Janice					
Identification of problem	58.3	95.5	94.4	100	98.1
State need for assistance	54.2	93.2	100	100	100
Social amenity	0	70.5	97.2	95.8	100
Brenda					
Identification of problem	50.9	80.5	94.4	100	100
State need for assistance	33.3	86.1	97.2	100	100
Social amenity	0	77.8	83.3	100	100
Dale*					
Identification of problem	25.0	100			
State need for assistance	9.4	100			
Social amenity	0	100			

* Intervention 1 data are shown for the final six sessions only.

video discrimination and work setting assessments. Data collectors recorded behaviors in 33% and 37.5% of discrimination and work setting assessments, respectively. Interobserver agreement was computed using the kappa statistic (Kazdin, 1982). Mean interobserver agreement in discrimination assessments for Janice, Brenda, and Dale was .972, .966, and 1.00, respectively. In the work setting assessments, agreement was 1.00 in all cases.

Verification of Intervention Procedures

Two graduate students unaffiliated with this study independently recorded the extent to which the trainer followed prescribed training and probe procedures in a random sample of nine intervention sessions. Observers' data indicated that 98.9% of training procedures and 100% of probe procedures were carried out as prescribed. Mean interobserver agreement, using kappa, was .994.

RESULTS AND DISCUSSION

Video-Assisted Training Assessment

Table 2 presents the mean video discrimination data on training situations for each participant. In baseline, Janice and Brenda identified slightly more than half of the problems shown on video (58.3% and 50.9%, respectively). Occasionally, they cor-

rectly stated the need for assistance in the problem situations shown. Dale identified problems less frequently and rarely stated the need for assistance. During baseline, no participant correctly stated a social amenity.

When video-assisted training was implemented in Intervention 1, all participants increased correct responses. Janice, Brenda, and Dale identified at least 80% of problems and correctly stated the need for assistance in most situations presented in Intervention 1. Social amenities also increased in Intervention 1, although mean percentages were lowest of the three components. For Janice and Brenda, all training data remained at high levels through Intervention 4. For Dale, only Intervention 1 was required for effects to generalize to the video probe situations and the work setting, so no subsequent interventions were implemented.

Video Probe and Work Setting Assessments

Janice's responses. The top panel of Figure 1 shows Janice's performance in the video probe assessments. In nine baseline sessions, she correctly stated the need for assistance in 25% to 50% of video situations. She did not use a social amenity during baseline. The second panel of Figure 1 shows Janice's performance in the work setting assessment. Her baseline levels of correct component

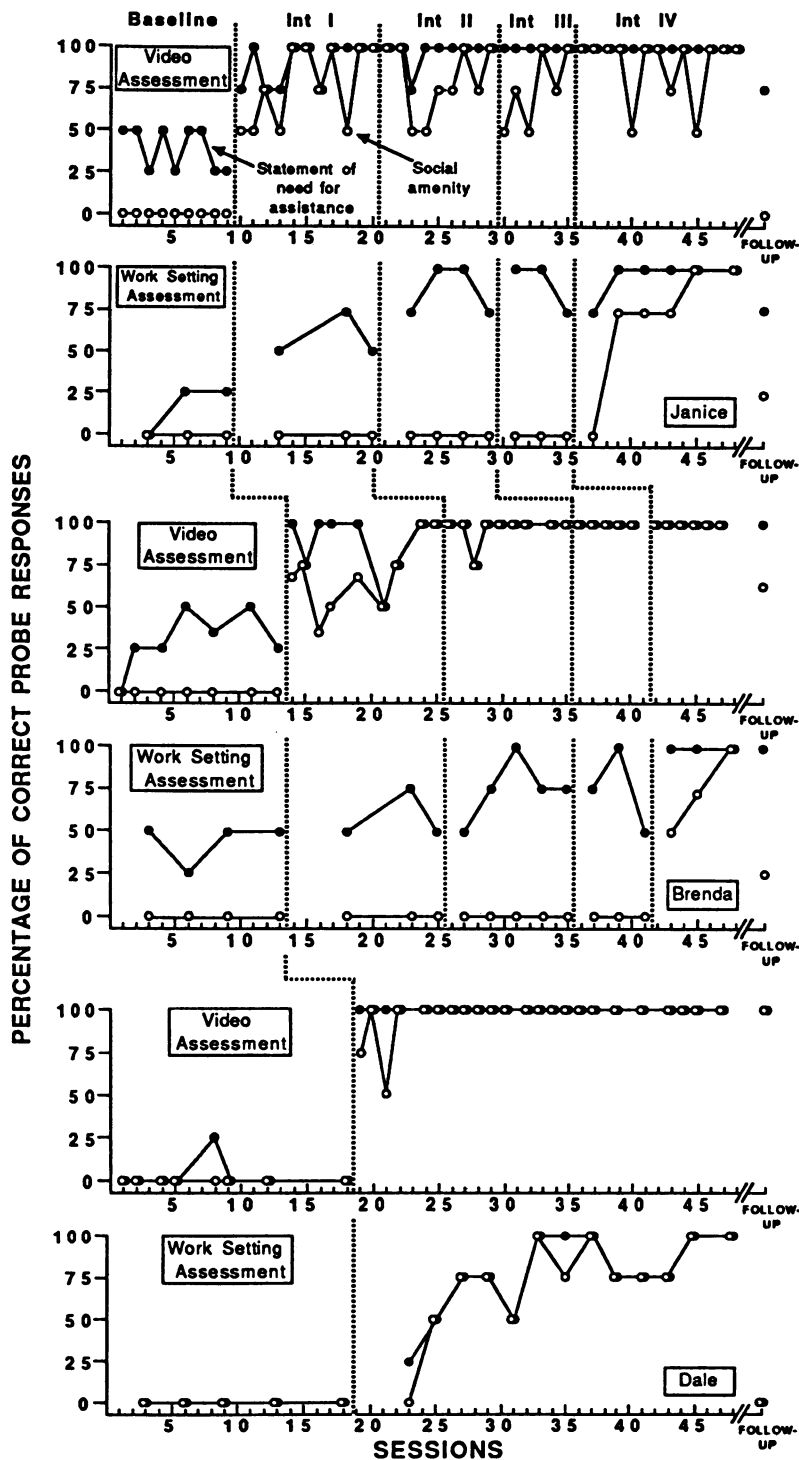


Figure 1. Participants' statements of the need for assistance and use of social amenities in video and work-setting generalization probes during baseline, interventions, and a 60-day follow-up of Study 1. Intervention 1 consisted of video-assisted training with an unfamiliar video model. Interventions 2, 3, and 4 added self-modeling, familiar supervisor, and behavioral rehearsal, respectively.

responses in the work setting ranged from 0% to 25%.

When Janice started Intervention 1 in Session 10, correct responses in the video probe assessments immediately increased. She correctly stated the need for assistance in 75% to 100% of video probes in Intervention 1. This component response was maintained at high levels (usually 100%) in Interventions 2 through 4. Social amenities also increased above baseline levels, but were not maintained at levels as high as statements of the need for assistance, even in Intervention 4. In the work setting, Janice's performance increased slightly when Intervention 1 was implemented. She correctly stated the need for assistance in 50% to 75% of situations, but did not use a social amenity. In Interventions 2 and 3, her statements of the need for assistance increased to 75% to 100%, but social amenities remained at zero. Thereafter, when Intervention 4 was implemented in Session 36, she exhibited much higher levels of both component responses in the work setting, reaching 100% in Sessions 45 and 48.

Janice's correct responses decreased in the 60-day follow-up. She stated the need for assistance and used social amenities less frequently in both video and work setting assessments. Again, social amenities occurred at lower levels than statements of the need for assistance.

Brenda's responses. The third and fourth panels of Figure 1 show Brenda's performance in the video probe and work setting assessments. Brenda's baseline assessment was extended through Session 13 (4 more days than Janice's baseline). In baseline video probes, Brenda correctly stated the need for assistance in 50% or fewer opportunities and she did not use a social amenity. In the work setting, baseline performance was similar to Janice's. Brenda occasionally stated the need for assistance but did not use a social amenity.

When Brenda started Intervention 1 in Session 14, correct responses in the video probe assessments immediately increased. Typically, Brenda stated the need for assistance and a social amenity in at least 50% of video probes in Intervention 1. In Intervention 2, component responses occurred at levels

of 75% to 100%. Brenda's performance on video probes during Interventions 3 and 4 exceeded Janice's, with both component responses occurring at 100% in all sessions. In the work setting, Brenda's performance was comparable to Janice's during Interventions 1 through 4. Correct statements of the need for assistance increased slightly during Interventions 1 and 2, were maintained during Intervention 3, and increased to 100% levels during Intervention 4. Brenda used social amenities in the work setting only after implementation of Intervention 4.

Brenda's performance decreased in the 60-day follow-up. In both video and work setting assessments, she continued to state the need for assistance but used fewer social amenities.

Dale's responses. The fifth and sixth panels of Figure 1 show Dale's performance. His baseline assessment was extended through Session 18 (5 more days than Brenda's baseline). Although baseline video and work setting assessments showed minimal correct component responses, Dale exhibited increasing levels of correct responses in the work setting assessment when Intervention 1 started. High levels of correct responses in the work setting precluded the need for Interventions 2 through 4. In Session 33, Dale reached 100% correct component responses in the work setting and maintained levels of 75% to 100% through Session 48. These data corresponded with 100% correct responses in the video assessment in Sessions 36 through 48.

In the 60-day follow-up, Dale correctly identified all components on video. In the work setting assessment, he did not request assistance in any work situation within the 1-min time limit. However, he did respond correctly in all work situations after a delay of about 3 min.

Summary

The results indicated that 3 participants discriminated components of requesting assistance in Intervention 1, but effects of training did not consistently generalize to the work setting for Janice and Brenda until they rehearsed responses in Intervention 4. In contrast, Dale requested assistance in the work setting in Intervention 1. For Janice

and Brenda, correct social amenities were performed at lower levels than statements of the need for assistance in baseline, most interventions, and the 60-day follow-up, both in video and work setting assessments. All participants responded to probe situations at levels similar to training situations. Follow-up data in the work setting for all participants showed diminished levels of correct responses in comparison with high levels of responses at the conclusion of training.

Discrimination and Generalization of Requesting Assistance

Janice and Brenda discriminated the components of requesting assistance and learned to respond correctly to video probe situations. However, the work setting performances of these participants raise questions about the limited generalization effects, especially with the social amenity component. Two possible explanations are offered. First, the social amenity may not have been as functional as the statement of need for assistance. Observations indicated that participants sometimes approached a supervisor and simply stated the need for assistance (e.g., "don't work," "I need help"). Although they neglected the social amenity, their responses nevertheless functioned to produce the supervisor's assistance, or at least a question such as "help with what?" The statement of the need for assistance was reinforced even in the absence of the social amenity. Interestingly, although community employers indicated that using a social amenity with one's supervisor was important, it was sometimes not functional in this work setting. Second, limited generalization may have occurred because verbal responses taught in discrimination training were not identical to responses in the work setting. Thus, the circumstance may have called for a complex type of stimulus *and* response generalization. For example, reporting to the trainer that the worker in a video scene "should have said 'excuse me, help please'" is a topographically different response to a different stimulus than actually requesting assistance of one's supervisor in a work setting. In the former case, the response is descriptive and made in reference to someone else (i.e., the video model).

In the latter case, the response is functional and communicates information to the supervisor about an actual problem one has encountered. In behavioral rehearsal, when the stimuli (i.e., problem situations) more closely approximated those in the work setting, the response finally functioned to produce assistance and eliminate the problem. Additional research is needed on the relationship between discriminating behaviors on video and performing them in other settings.

Unlike Janice and Brenda, Dale immediately identified most problems and the worker's requests for assistance in video discrimination training. When shown an incorrect example of how to request assistance, Dale often reported what the worker should have done, rather than describing the error. In essence, he discriminated the relationship between the stimuli, the anticipated correct response, and the consequences. Using Whitehurst's (1978) description of observational learning, Dale may have attended to the relationship between all of these events so that the stimuli preceding the model's behavior controlled his behavior. Perhaps Dale classified the video stimuli (problem situations) as being equivalent to those in the work setting. When he discriminated these stimuli and the related responses on video, similar stimuli in the work setting may have controlled his behavior.

Potential Confounding Effects and Limitations of Research

It is noteworthy that, for different participants, generalization may have been confounded by practice or order effects. In Dale's case, increased practice opportunities may have contributed to improved performance in the work setting. Data show that changing from weekly to biweekly work sets at Session 25 corresponded with higher performance. However, because requests for assistance in the work setting during baseline were at zero levels, it seems unlikely that increased practice alone could have accounted for acquisition of the behavior. For the other participants, the order of Interventions 1 through 3 and frequent practice of the target behavior may have enabled improved performance in the work setting in Intervention 4. That is, had

Intervention 4 been introduced first, it may not have produced generalized effects in the work setting. In the future, similarly designed research should employ an additional set of participants, settings, or target behaviors with the participants receiving the most intensive intervention first to control for order and practice effects.

Generalization effects in this study must be qualified given that program supervisors' behaviors in the work setting were relatively uncontrolled. Although supervisors were told by the trainer to deliver instructions that led participants to encounter problems, the supervisors were not specifically told how to respond to requests for assistance. Thus, when supervisors learned what behavior had been targeted, they may have offered assistance before a good request was made, or responded differently across participants. In effect, they may have inadvertently mediated generalization in the work setting. Although informal observations did not identify these confounding effects, neither were specific data collected on supervisors' behaviors. In future research, the behaviors of individuals who interact with experimental participants in social skills research should be anticipated and quantified to determine whether they have an impact on the variables under study.

Conclusions about the effects of video training alone are limited by the effects of behavioral rehearsal for Janice and Brenda. In fact, the findings raise questions about whether video training was needed at all, or whether rehearsal alone may have accounted for the generalized effects. Again, future research should be designed to isolate video training more completely from its associated intervention procedures.

Learning More Efficiently from Video

In this study, Janice and Brenda required intensive training before they requested assistance. They did not learn this target behavior efficiently from video. Findings from other research have shown that some adults with severe disabilities can learn successive responses with less training (McCuller, Salzberg, & Lignugaris/Kraft, 1987; Pancsofar & Bates, 1985); this may have important implications

for teaching skills to adults such as Janice and Brenda. That is, these learners may become more efficient in learning from video alone after they have watched video and rehearsed successive responses. Research should investigate whether this efficiency effect, or "learning to learn" (Browder, Schoen, & Lentz, 1986–1987), applies to video-assisted training of skills of adults with severe mental retardation.

Results of Study 1 raise many questions, including the following: (a) Do adults with severe mental retardation learn new behaviors from video as a function of training successive behaviors with video plus rehearsal? (b) Do effects generalize to new work situations with video training alone after participants receive video training and rehearsal for responses to successive work situations? (c) Do effects of video-assisted training generalize to different responses that have not been trained through video? These questions were addressed in Study 2.

STUDY 2

METHOD

Participants and Setting

Brenda and Janice, 2 of the participants in Study 1, also participated in this study. They were selected because both had participated in video-assisted training and behavioral rehearsal in Study 1 before intervention effects consistently generalized to their work setting. Dale, the other participant in Study 1, did not participate because video-assisted training alone was sufficient to produce the target behavior in his work setting. This study was conducted in the same employment program described in Study 1.

Target Behavior and Work Problems

Responding to work problems was targeted in this study. Three component responses were (a) identifying work problems, (b) responding to problems by fixing them, and (c) reporting the problems or solutions to the supervisor. Four different work problems were arranged, including a set of keys left in a door lock, trash strewn on the floor, a water faucet left running, and a chair blocking an aisle.

Each work situation required participants to identify the problem, fix it, and report it to the supervisor, but the responses to each problem were topographically different. These responses were targeted because (a) supervisors reported the work problems frequently occurred, (b) supervisors reported the participants needed to learn how to respond to these problems, and (c) observations prior to the study confirmed that neither participant fixed or reported problems. Program staff reported these problems adversely affected flow of production, safety, work routine, or the appearance of the work setting. Supervisors wanted the problems reported so they could take measures to prevent future occurrences and commend workers for their initiative. One component response, reporting the problem, was considered an employment-related social behavior because information was communicated to the supervisor.

Definitions of Component Responses

"Identifying work problems" was a component response in the video assessment only. It was defined as labeling an adverse work situation shown on video. "Fixing work problems" and "reporting problems to the supervisor" were component responses in both video and work setting assessments. "Fixing work problems" was defined as performing the motor responses necessary to remedy a specific work situation (e.g., taking keys from the door). Participants had to fix the problem within 30 s after they had encountered it. Encountering the problem was defined as moving to within 1.5 m of the item (e.g., the door lock with the keys). "Reporting the problem or solution to the supervisor" was defined as describing either the problem (e.g., "the keys were in the door") or its solution (e.g., "I got the keys from the door") within 1 min of encountering it.

Dependent Measures

Two dependent measures were (a) the percentage of each correct component response identified in the video assessments and (b) the percentage of each correct component response exhibited in the work setting assessments. Assessment procedures are described below.

Assessments

Video assessment. Video assessments were similar to those described in Study 1. A participant viewed one videotape containing a series of eight scenes of the same worker and supervisor shown in the Study 1 tapes. These eight scenes consisted of two examples of each of four work problems. Examples of each problem showed variations in the work setting, materials, and supervisor's instructions, but the worker's responses in each example remained exactly the same. The worker encountered a problem while carrying out an instruction, then fixed and reported it to the supervisor. For example, in one scene the supervisor instructed the worker to put a hand truck in a storage room. The worker found a set of keys in the storage room door lock, returned them to the supervisor, and stated, "Pardon me, I found these keys in the door." All scenes showed the worker responding correctly to work problems.

In each session, the trainer selected a videotape for viewing in the same manner as described in Study 1. Following each scene, the trainer stopped the videotape and asked (a) "What problem did the worker see?" (b) "How did the worker fix the problem?" and (c) "After the worker fixed the problem, what did she say to the supervisor?" A data collector recorded whether the participant identified the problem, described how the worker fixed it, and stated how the worker reported it to the supervisor. Data were expressed as the percentage of correct component responses.

Work setting assessment. Work setting assessments were similar to those conducted in Study 1. Work problems were arranged at least 30 min after a participant's intervention session. Each instruction that involved a work problem was interspersed with one or two instructions that did not involve problems. For each problem, the data collector recorded whether the participant fixed or reported it to the supervisor. Data were expressed as the percentage of correct component responses to each work problem.

Follow-up assessment. Video and work setting assessments were conducted 60 days after the final intervention session in a manner identical to that described in Study 1.

Probes of an additional work problem. Participants' responses to an additional work problem (spilled pipe parts on the floor of a work area) were assessed but were excluded from training. The purpose of this assessment was to examine whether participants' responses would be applied to a novel work problem. Responses to this work problem were assessed in video and work setting probes. These probes were arranged in the first baseline session, at the end of the interventions (i.e., Session 37), and in the 60-day follow-up.

Experimental Design

A multiple baseline across 2 participants was used to investigate the effects of video-assisted training on fixing problems and reporting them to the supervisor. For each participant, training procedures were applied sequentially across four work problems. After responses related to the first work problem generalized to the work setting, training was implemented for component responses to the second work problem, and so on. The multiple baseline was not designed across work problems because the purpose of the study was to investigate whether participants would respond to new work problems with less training as a function of training successive responses. Initially, training was applied to responses to "keys in the door lock" for both participants. However, training of responses to the remaining three work problems was counterbalanced across participants to control for order effects (Barlow & Hersen, 1984).

Procedure

Baseline. The baseline condition consisted of video and work setting assessments. When the intervention was implemented for component responses to the first problem with Brenda, baseline assessments continued for her responses to other problems and for all of Janice's responses on a reduced schedule of one to four times weekly.

Intervention 1: Video-assisted training. Training was applied sequentially to responses to the four work problems. Therefore, some (but not all) work problems shown on video were initially involved in training. For example, training procedures were first applied to the component responses

to the "keys in the door lock" problem, but not to the component responses to the other three problems. Later, training procedures were successively applied to the component responses to the other problems.

The first time a scene was shown, the trainer described the model's actions by saying "The worker sees a problem" and pointing to the TV screen. Second, the trainer named the problem, then said "Now the worker is going to fix the problem." After describing how the worker fixed the problem, the trainer said "Now the worker is going to tell the supervisor." Next, the trainer replayed the entire scene so the participant could watch it without verbal description or video pauses. (The trainer did not describe a scene after the first showing.) After replaying each scene, the trainer stopped the videotape and asked the assessment questions. The trainer provided positive or corrective consequences as described in Study 1. Intervention 1 continued for the first work problem until a participant correctly identified 100% of the components for two consecutive sessions. If the participant met this criterion but did not respond correctly in the work setting for two consecutive sessions, Intervention 2 was implemented. However, if the participant responded correctly in the work setting, Intervention 2 was not implemented and Intervention 1 was initiated for responses to the next problem.

Intervention 2: Video-assisted training and behavioral rehearsal. Intervention 2 was identical to Intervention 1, except a participant's responses to scenes of work problems were followed by behavioral rehearsal in the training room. Rehearsal procedures were identical to those described in Study 1. Intervention 2 continued until the participant responded correctly in the work setting by fixing the problem and reporting it to the work supervisor for at least four consecutive sessions.

Interobserver Agreement

The trainer taught the data collector in both video and work setting assessment procedures and served as the second data collector. The trainer and data collector independently recorded component responses in 41% and 37.5% of video and work setting assessments, respectively. Interobserver

agreement was again computed using the kappa statistic (Kazdin, 1982). Mean interobserver agreements in video assessments for Brenda and Janice were .990 and .978, respectively. The range of interobserver agreement across sessions was .834 to 1.00. Interobserver agreement in all work setting assessments was 1.00 for both participants.

RESULTS AND DISCUSSION

Brenda's Responses

Baseline data. Figure 2 shows Brenda's video and work setting assessment data. For each of the four work problems, the top panel displays Brenda's video assessment data. Brenda participated in five baseline assessments for responses to the "keys in door lock" problem, and her identification of components ranged from 0% to 16.7%. Identification of components to "trash on the floor" ranged from 0% to 75%, and identification of components to "water faucet on" and "chair in the aisle" generally ranged from 0% to 50%.

For each of the four problems, the bottom panel of Figure 2 presents the work setting data. Brenda did not respond in baseline to problems of "keys in the door lock" or "trash on the floor," and only occasionally responded to problems of "water faucet on" and "chair in the aisle."

Data from Interventions 1 and 2. When Intervention 1 was implemented in Session 6 for "keys in the door lock," Brenda correctly identified 67% of the components (Figure 2). Correct identification increased to 100% in Sessions 8, 11, and 13. However, even though Brenda correctly identified the component responses in video assessments, she did not fix or report the "keys in the door lock" problem in the work setting. Thus, Intervention 2 (video-assisted training and behavioral rehearsal) was implemented for responses to this problem. After two sessions of Intervention 2, Brenda responded to this problem in the work setting. Brenda's responses to the second problem (i.e., "trash on the floor") were similar to her responses to "keys in the door lock." As shown, she correctly identified all components on video, but did not fix or report the problem in the work setting. However, when Intervention 2 was implemented, Brenda soon responded in the work setting.

For the problems of "water faucet on" and "chair in the aisle," video-assisted training alone produced correct responses in the work setting. Because Brenda correctly responded in the work setting when Intervention 1 was implemented for the two latter problems, Intervention 2 was unnecessary.

On the right side of each panel in Figure 2, 60-day follow-up data in the video and work setting assessments are presented. In the video follow-up assessment, Brenda correctly identified all components to three of four problems. In the work setting follow-up assessment, Brenda solved and reported all problems.

Janice's Responses

Baseline data. Figure 3 shows Janice's video and work setting assessment data. Janice's baseline assessment for responses to the problem of "keys in the door lock" was extended to seven sessions in 10 days (5 more days than Brenda's assessment). In the video assessment, Janice correctly identified few components. In the work setting, Janice's responses to all problems were at zero levels except for removing "trash from the floor" in Session 28.

Data from Interventions 1 and 2. When Intervention 1 was implemented, Janice correctly identified most components (Figure 3). However, for keys in the door lock, correct identification of components on video was not associated with correct responding in the work setting. When Intervention 2 started for "keys in the door lock," Janice soon fixed and reported the problem in the work setting. After participating in Intervention 2 for the same problem, she correctly responded in the work setting when Intervention 1 was implemented in succession for responses to "chair in the aisle," "water left on," and "trash on the floor." For each problem, she correctly responded in the work setting in the second session of Intervention 1. Thus, Janice learned to fix and report three work problems with video-assisted training alone.

Figure 3 also presents Janice's 60-day follow-up data. In the video follow-up assessment, Janice correctly identified all components except two (i.e., how the worker fixed the "chair in the aisle" and "trash on the floor" problems). In the work setting, Janice exhibited four of eight component responses.

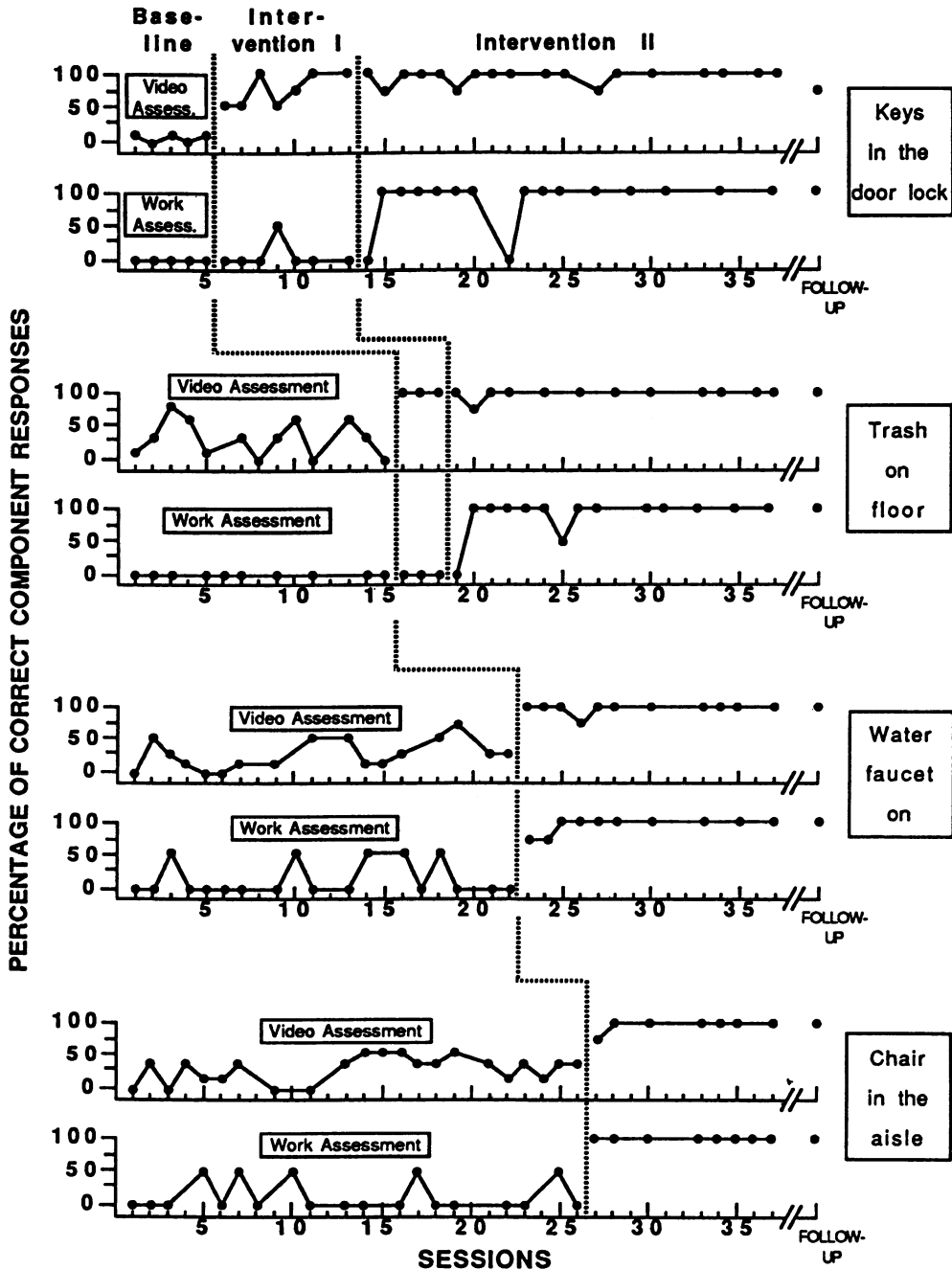


Figure 2. Brenda's component responses to four work problems in baseline, Intervention 1 (video training), Intervention 2 (video training plus behavioral rehearsal), and a 60-day follow-up of Study 2. For each problem, the top panel shows video assessment data and the bottom panel shows work-setting assessment data.

She fixed and reported "keys in the door lock" but did not report "chair in the aisle" or "water faucet on," nor did she fix or report "trash on the floor."

Probes of the additional work problem. In the baseline video probe (Session 1), neither Brenda

nor Janice identified any of the components of "spilled pipe parts." At the conclusion of the interventions (Session 37) and in the follow-up probe, both participants identified all components on video. However, in the work setting, neither Brenda

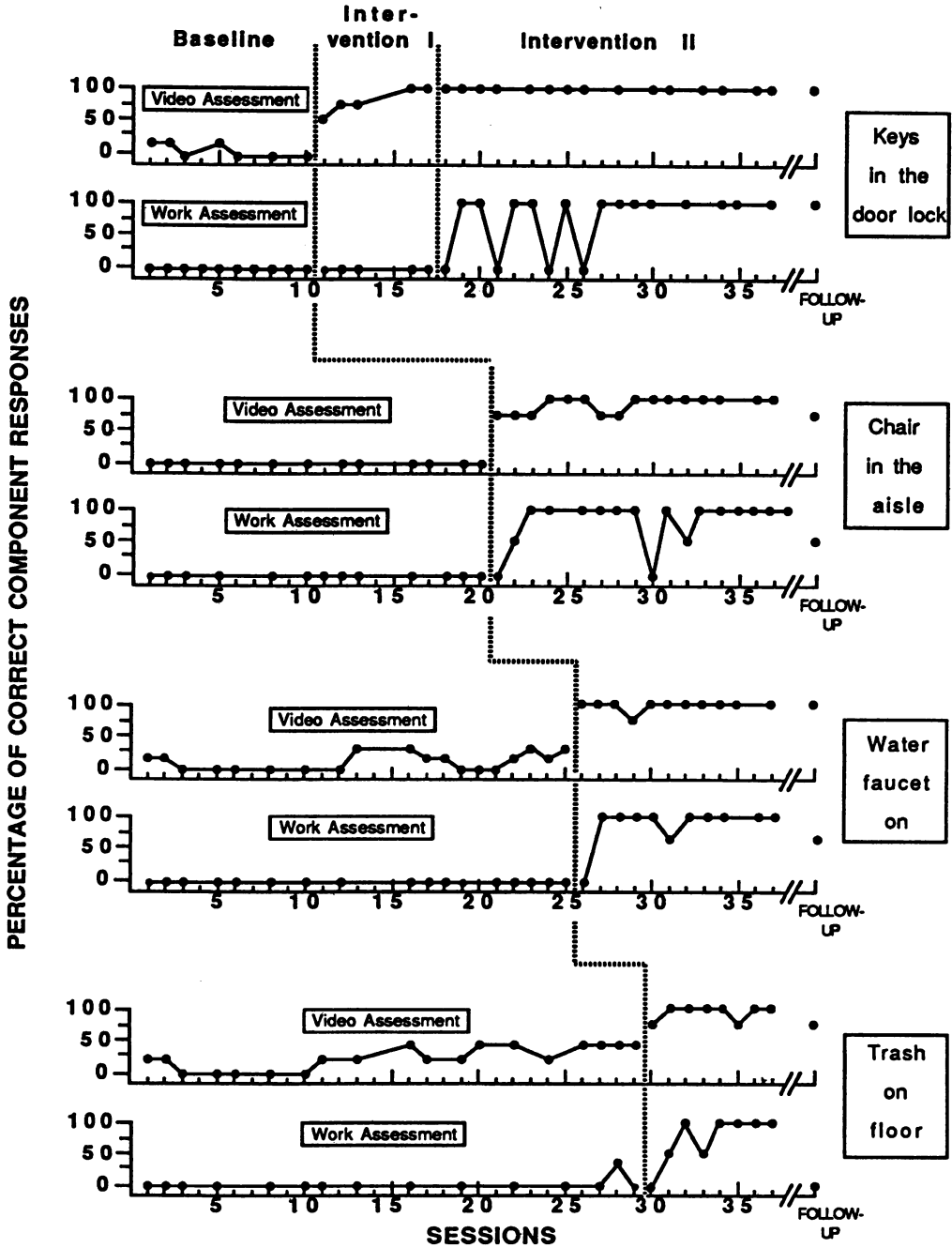


Figure 3. Janice's component responses to four work problems in baseline, Intervention 1 (video training), Intervention 2 (video training plus behavioral rehearsal), and a 60-day follow-up of Study 2. For each problem, the top panel shows video assessment data and the bottom panel shows work-setting assessment data.

nor Janice fixed or reported the problem during baseline, at the end of the interventions, or in the follow-up assessment.

Summary

Findings from Study 2 indicate the 2 participants learned to identify four work problems on video, and then fixed and reported the problems in their work settings. Both participants learned to fix and report work problems from video alone after they rehearsed responses to one or two problems. However, effects failed to generalize to a novel work problem. Follow-up assessments indicated that most responses were maintained after 60 days.

Brenda and Janice initially identified components shown on video but did not perform the responses in the work setting. In this regard, their initial performance in Study 2 resembled their performance in Study 1. However, after participating in the second intervention, which combined video-assisted training and rehearsal for one or two work problems, they soon performed the responses in the work setting with video-assisted training alone.

Participants responded to successive work problems with less training. Results of this study demonstrated that these adults with severe mental retardation learned more efficiently from video models. Although effects generalized to the work setting for each of four work problems included in video-assisted training, effects did not generalize to a problem that was excluded. This finding suggests that merely observing the responses on video without an accompanying requirement to respond was not sufficient to produce the behavior in the work setting. Additional research is needed to determine the variables that control acquisition and generalization of employment-related skills for new work problems based exclusively on the opportunity to observe responses on video.

GENERAL DISCUSSION

Findings from these two studies suggested that the participants with severe disabilities learned to discriminate the relevant dimensions of requesting

assistance, fixing problems, and reporting problems to supervisors when these behaviors were presented on video. However, 2 of 3 participants in the first study did not perform these responses in the work setting until they had rehearsed and received feedback for responses in the training setting. One possible explanation for the limitations in generalized effects may be that video-assisted training was not sufficiently designed to draw Janice's and Brenda's attention to the relationship among the controlling stimuli, the responses, and the consequences. If, as Whitehurst (1978) suggested, learners must discriminate the relationship among all of these events for observational learning to occur, then the discrimination training component in this research may have been inadequately designed. Although Janice and Brenda correctly responded to questions about the problems and the worker's responses shown on video, they were not questioned about the relationships between these events. For example, they were not asked "What should the worker do?" or "What might happen if the worker does or does not ask for help?" Future research should examine the structure of video-assisted training in relation to generalization effects.

These studies investigated the conditions under which effects of video-assisted training generalized to employment-related skills in a work setting. Findings indicated that 2 participants demonstrated changes in work behavior with video-assisted training alone only after several experiences in which video was paired with behavioral rehearsal. These findings suggest that participants may have learned the components of a response class (e.g., requesting assistance) only after members of a stimulus class (problem situations) were presented both live and on video. However, problems with the experimental designs limit inferences from these findings. In addition to the potential confounding effects discussed in Study 1 (i.e., practice and order effects), findings in Study 2 may have been a function of participants having previously been involved in Study 1. Indeed, if Janice and Brenda had not participated in video discrimination training and rehearsal in the first study, their work setting re-

sponses in the second study may have occurred at lower levels.

Follow-up data generally showed decreases in responding, particularly in Study 1. These data suggested that participants requested assistance less frequently (or, in Dale's case, less quickly) when problems were encountered. However, these findings may have been expected, given that practice opportunities probably decreased after the conclusion of the study. That is, participants may have encountered fewer situations calling for the target responses, and thus received fewer opportunities to respond. The variables producing the initial generalization effects may no longer have been operating to maintain responses. If this accounted for the decreases found in follow-up, it should remind researchers that intensive training procedures must be faded over time until they approximate naturally occurring events in order for behaviors to be maintained (Stokes & Osnes, 1988).

Collectively, the two studies generated findings suggesting that video can be a useful and efficient means of assisting in teaching skills to adults with severe mental retardation. However, the findings also indicated that these adults may have had to be taught systematically how to learn efficiently from video. Future research in this area should address several issues. First, investigators should attempt to isolate further the effects of video from other training procedures. Second, research should account for potential order and practice confounding effects. Third, studies should focus on the activities of individuals (e.g., program supervisors) who may mediate generalization effects. Finally, investigators should examine more specifically how training can be designed so that participants can learn social and other skills more efficiently from video.

REFERENCES

- Andrasik, F., & Matson, J. L. (1985). Social skills training for the mentally retarded. In L. L'Abate & M. A. Milan (Eds.), *Handbook of social skills training and research* (pp. 418-454). New York: Wiley.
- Bandura, A. (1969). *Principles of behavior modification*. New York: Holt, Rinehart, and Winston.
- Bandura, A., Ross, D., & Ross, S. A. (1963). Imitation of film-mediated aggressive models. *Journal of Abnormal and Social Psychology*, **66**, 3-11.
- Barlow, D. H., & Hersen, M. (1984). *Single case experimental designs: Strategies for studying behavior change* (2nd ed.). New York: Pergamon.
- Bates, P. (1980). The effectiveness of interpersonal skills training on the social skill acquisition of moderately and mildly retarded adults. *Journal of Applied Behavior Analysis*, **13**, 237-248.
- Bornstein, P. H., Bach, P. J., McFall, M. E., Friman, P. C., & Lyons, P. D. (1980). Application of a social skills training program in the modification of interpersonal deficits among retarded adults: A clinical replication. *Journal of Applied Behavior Analysis*, **13**, 171-176.
- Browder, D. M., Schoen, S. F., & Lentz, F. E. (1986-1987). Learning to learn through observation. *Journal of Special Education*, **20**, 447-461.
- Chadsey-Rusch, J., Karlan, G. R., Riva, M. T., & Rusch, F. R. (1984). Competitive employment: Teaching conversational skills to adults who are mentally retarded. *Mental Retardation*, **22**, 218-225.
- Charlop, M. H., & Milstein, J. P. (1989). Teaching autistic children conversational speech using video modeling. *Journal of Applied Behavior Analysis*, **22**, 275-285.
- Dowrick, P. W., & Hood, M. (1981). Comparison of self-modeling and small cash incentives in a sheltered workshop. *Journal of Applied Psychology*, **66**, 394-397.
- Ferguson, G. A. (1981). *Statistical analysis in psychology and education*. New York: McGraw-Hill.
- Haring, T. G., Kennedy, C. H., Adams, M. J., & Pitts-Conway, V. (1987). Teaching generalization of purchasing skills across community settings to autistic youth using videotape modeling. *Journal of Applied Behavior Analysis*, **20**, 89-96.
- Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford University Press.
- Krantz, P. J., MacDuff, G. S., Wadstrom, O., & McClannahan, L. E. (1991). Using video with developmentally disabled learners. In P. W. Dowrick (Ed.), *Practical guide to using video in the behavioral sciences* (pp. 256-267). New York: Wiley.
- McCuller, G. L., Salzberg, C. L., & Lignugaris/Kraft, B. (1987). Producing generalized job initiative in severely mentally retarded sheltered workers. *Journal of Applied Behavior Analysis*, **20**, 413-420.
- Pancsofar, E. L., & Bates, P. (1985). The impact of acquisition of successive training exemplars on generalization. *Journal of the Association for Persons with Severe Handicaps*, **10**, 95-104.
- Salzberg, C. L., Agran, M., & Lignugaris/Kraft, B. (1986). Behaviors that contribute to entry-level employment: A profile of five jobs. *Applied Research in Mental Retardation*, **7**, 299-314.
- Stokes, T. R., & Osnes, P. G. (1988). The developing applied technology of generalization and maintenance. In R. H. Horner, G. Dunlap, & R. L. Koegel (Eds.), *Generalization and maintenance: Life-style changes in applied settings* (pp. 5-20). Baltimore: Paul H. Brookes.

- Striefel, S., & Eberl, D. (1974). Imitation of live and videotaped models. *Education and Training of the Mentally Retarded*, *9*, 83-88.
- Whitehurst, G. J. (1978). Observational learning. In A. C. Catania & T. A. Brigham (Eds.), *Handbook of applied behavior analysis: Social instructional processes* (pp. 142-178). New York: Irvington.
- Wolf, M. M. (1978). Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis*, *11*, 203-214.

Received May 22, 1991

Initial editorial decision November 29, 1991

*Revisions received January 21, 1992; February 18, 1992;
February 27, 1992*

Final acceptance March 6, 1992

Action Editor, Scott McConnell